

DRAFT -- Appendix A

Reply Comments NPRM 18-295

of

Encina Communications Corporation

March 14, 2019

Encina Communications Corp.

Overview

I. Failings of the RLAN Group's Positions

- ECC agrees with AT&T's detailed assessment¹ of The RLAN Group's report, in which they find it highly flawed, as well as RLAN's assertions based on that report.

II. Inclusion Zones – A Better Way For All

- ECC's proposal safely turns an Exclusion Zone into an Inclusion Zone, allowing unlicensed devices to operate in this area without any harmful interference to incumbents.
- ECC's proposal safely allows for a much simpler AFC, so the Commission could proceed much sooner than the two or more years expected by HPE² and others.

1. Comments filing of AT&T, ET 18-295, February 15, 2019.

2. Comments filing of HPE, ET 18-295, February 15, 2019.

Failings of the RLAN Group's Positions

ECC agrees with AT&T¹: *“Those seeking to introduce potentially disruptive, unlicensed uses into the 6 GHz band (“RLAN advocates”) should therefore bear the burden of demonstrating, by clear and convincing evidence, that the proposed uses would cause no harmful interference. A review of the underlying NOI record demonstrates, however, that RLAN advocates have failed thus far to meet their high burden of proof. Indeed, RLAN advocates have derived their interference and margin analysis from a single RKF study that was prepared at the behest of RLAN advocates. Yet, this RKF study has drawn significant criticism regarding its methodology, assumptions, conclusions, and completeness...”*

ECC also agrees with the Ultra Wideband Alliance²: *“The RKF study referenced by the RLAN proponents examines only a subset of licensed Fixed Service users; the RKF Engineering Solutions study is incomplete and the conclusions stated by WFA are flawed. The RKF study was commissioned by the RLAN proponents, and hence the results are predictable. The study, by RKF’s own admission, is incomplete and lacking thorough evaluations of other users in the frequency band. The results are analogous to all the studies that showed smoking was not detrimental to respiratory health that were commissioned by the cigarette industry in the 60’s.”*

1. AT&T filing ET 18-295, February 15, 2019, I Introduction.

2. Ultra Wideband Alliance, filing GN 17-183, October 16, 2018, page 4

Failings of the RLAN Group's Positions

A. The Commission Should Not Permit Unlicensed Devices to Operate in the 6 GHz Band without AFC

ECC disagrees with the RLAN Group, HPE and Broadcom that low power (30 dBm) and very low power (14 dBm) unlicensed devices can be safely deployed without AFC, and that the pointing of FS links at buildings is "vanishingly small".¹ Consider the following real-world case:

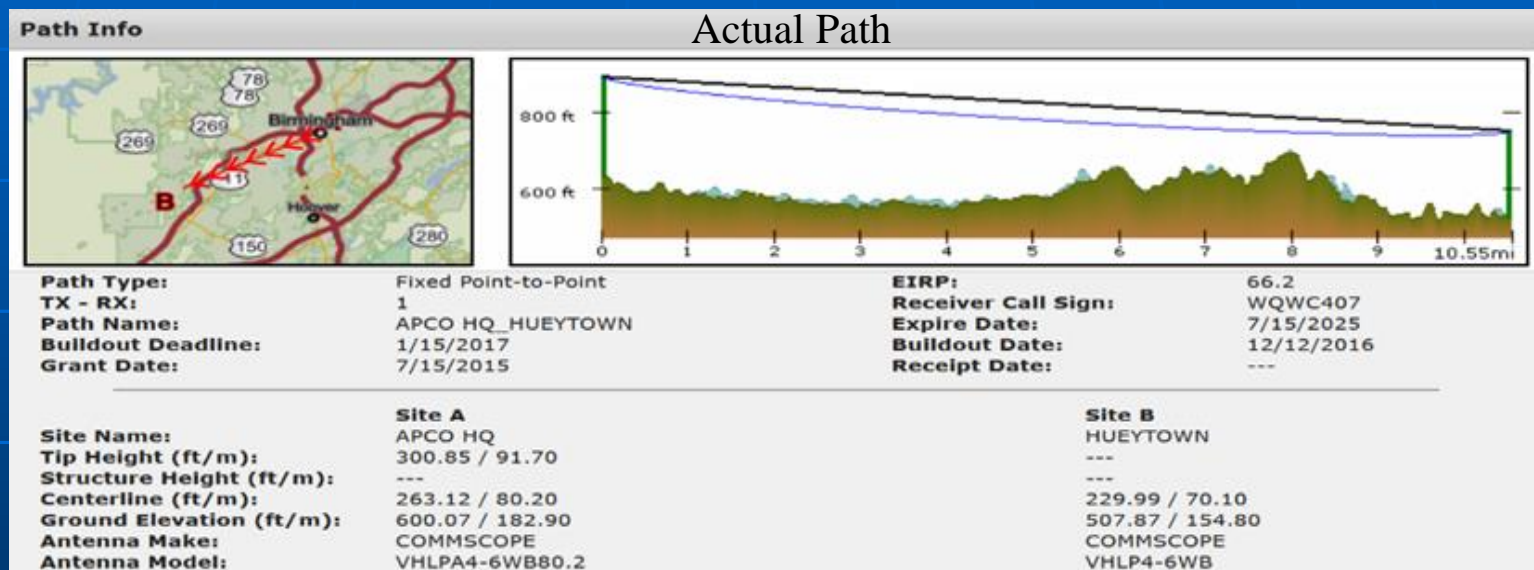


Figure 1 shows the path profile of a licensed link going to a rooftop in Birmingham, Alabama using VHLP4-6 antennas.

1. RLAN Group's filing NPRM 18-295/17-183 February 15, 2019, Section IIB., page 35; HPE's filing NPRM 18-295/17-183 February 15, 2019, pages 7-8, 16-17; Broadcom's filing NPRM 18-295/17-183 February 15, 2019, pages 2, 27.

Failings of the RLAN Group's Positions



Figure 2 shows the path termination on the roof of a high-rise building.

A LOS path calculation from the terminating point of the microwave path at this building shows that for an unlicensed device with an EIRP of 14 dBm inside the building, with a far end 4-ft. dia. receive antenna (35 dBi) and a path length of 10.55 miles, the building loss would have to be 38 dB. For a 12-ft. dia. antenna (45 dBi), the loss would have to be 48 dB to meet a required interference level of -101 dBm.

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Failings of the RLAN Group's Positions

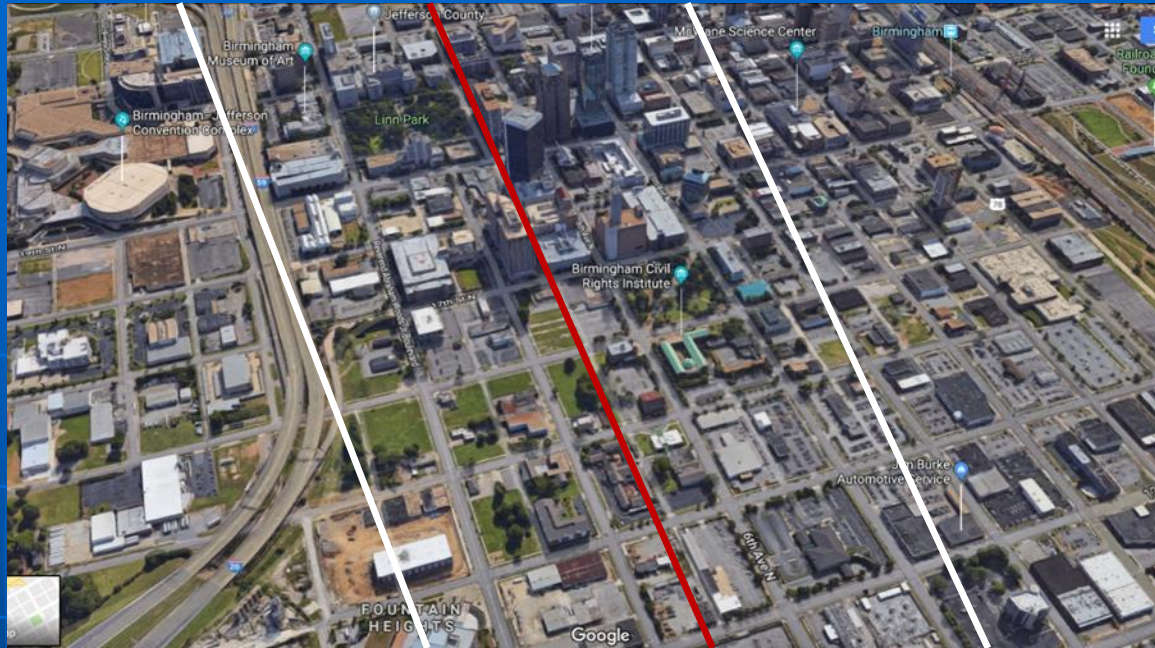


Figure 3 shows the path's main beam centerline and the distance to the antenna's 3 dB points.

The 3 dB beam width of the main lobe of the victim's antenna is 2800 feet at 10.55 miles and encompasses multiple buildings. Indoor unlicensed devices with an EIRP of 14 dBm would present interference problems even if the building loss were between 18 and 30 dB (the range that HPE gives¹), as that falls below the necessary 38 dB given in Slide 6. Outdoors, where there is LOS to the victim station, the interference would be -66 dBm or more. Obviously unacceptable.

1. HPE's filing NPRM 18-295/17-183 February 15, 2019, page 14.

Discussion

B. The Problems with Prohibiting Unlicensed Devices from Operating Within Exclusion Zones

The Commission's goal of expanding Flexible Use in mid-band spectrum is commendable.

However, by prohibiting unlicensed devices from operating co-channel with any fixed link within that link's defined exclusion zone¹, and by proposing the use of AFC to protect licensed stations, the consequences are:

- (a) The use of unlicensed devices would be relegated to very small areas of operation, serving a very small percentage of the population², and
- (b) The use of an AFC which is required to operate in real-time to prevent harmful interference into licensed stations is technically difficult and would require considerable laboratory and field testing before it was proven safe³, possibly delaying a Report and Order and commercial deployment by years. HPE estimates it will take a minimum of 2 years⁴ to certify an AFC system.

1. NPRM 18-295 paragraphs 23 and 37

2. ECC's comments filing NPRM 18-295/17-183 February 1, 2019, page 4

3. AT&T's filing NPRM 18-295/17-183 February 15, 2019, pages 13-14

4. HPE filing re NPRM 18-295, February 15, 2019, page 9

Inclusion Zones – A Better Way for All

ECC's proposal safely turns an Exclusion Zone into an Inclusion Zone, allowing unlicensed devices to operate in this area without any harmful interference to incumbents.

Proposed Minor Modification to the NPRM

With the proposed minor modification to NPRM paragraph 23(below), which deals with exclusion zones, licensed stations will be protected and AFC requirements will be simplified.

NPRM 18-295 paragraph 23: *“The proposed framework for U-NII-5 and U-NII-7 prohibits unlicensed devices from operating co-channel with any fixed link within that link’s defined exclusion zone unless the unlicensed device is operated with the permission of the fixed station’s operator.”* [underlined text added]

Also add: *"The licensee's new or modified Prior Coordination Notice (PCN) must show the area around the station where unlicensed devices can be safely used. Specifically, it must show that the interfering signal level arriving at any licensed station, within 125 miles (250 miles on the main beam), from an unlicensed device (I_{ud}) that is deployed around a Licensed (reference) Station (LRS) will be less than the interfering signal level from the LRS (I_{LRS}), i.e., ($I_{ud} < I_{LRS}$), or less than the maximum allowed interference level ($I_{ud} < I_{max}$), typically -101 dBm."*

Because the PCN is subject to peer review of every licensed station within 125 miles around the new applicant station (250 miles on the main beam), this will eliminate concerns regarding harmful interference of unlicensed devices into the licensed stations and simplify the AFC protocol.

Inclusion Zone Example

Deployment of 6 GHz Networks in cities, towns and rural communities nationwide which safely supports licensed and unlicensed devices:

1. Find a clear 6 GHz frequency
2. Frequency Coordinator performs an interference analysis including licensed/unlicensed devices within a Safe Area inside an Exclusion (Inclusion) Zone
3. Frequency Coordinator completes the PCN process
4. Network is built with fixed equipment
5. Provider advertises that 6 GHz unlicensed service now available
6. Purchasers can buy unlicensed devices online, from electronic stores, etc.
7. Upon connection to the Internet the device is authenticated and the AFC confirms the device is within the Safe Area (also referred to as the Umbrella Area) the AFC authorizes the AP to operate on the station's licensed frequency.

Inclusion Zone Example – More Detail

Example

A NEW applicant wants to license a new station with a hub-and-spoke configuration, operating TDD-TDMA, where each spoke will be the center line of that path and where the applicant plans to deploy licensed stations and/or unlicensed devices within each of the path's exclusion zones, as shown in Figure 4.

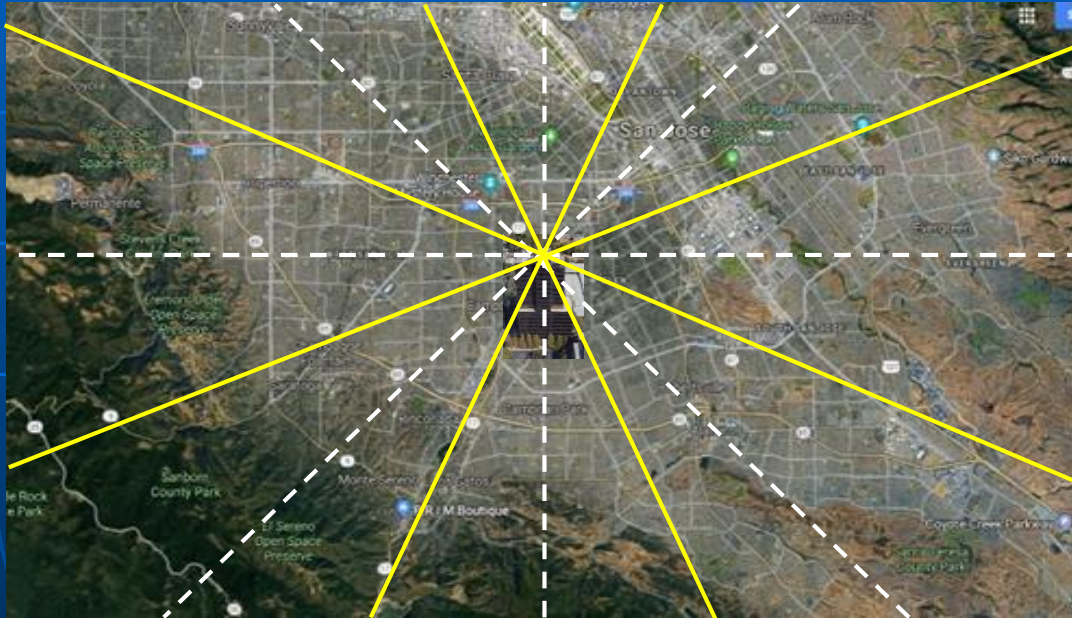


Figure 4

Inclusion Zone Example – More Detail

First the applicant chooses the tallest building in the area so as to service the maximum number of LOS customers (if the tallest building is not available the applicant would choose four in-close buildings, one on each side of the city, with each covering 25% of the market), and then contacts a Frequency Coordinator to perform an interference analysis per Rule 101.103 and issue a PCN.

If the new applicant PCN clears prior coordination, and the EIRP of the unlicensed devices is less than the EIRP of the LRS, and the unlicensed devices are within a very short distance of the LRS, then it is obvious that they will not cause harmful interference to any existing licensed stations. However, as the unlicensed devices move away from the LRS, there comes a time when they could, on a LOS basis, cause harmful interference. The Frequency Coordinator determines the maximum distance that APs and Clients can be from the LRS, resulting in a typical market area of 120 square miles (see Figure 5).

If during the Prior Coordination analysis, the Frequency Coordinator determines that there is an interference case in one or more sectors, there are a plethora of techniques that can be used to resolve it. Frequency Coordinators are experts in alleviating such problems.

Inclusion Zone Example – More Detail

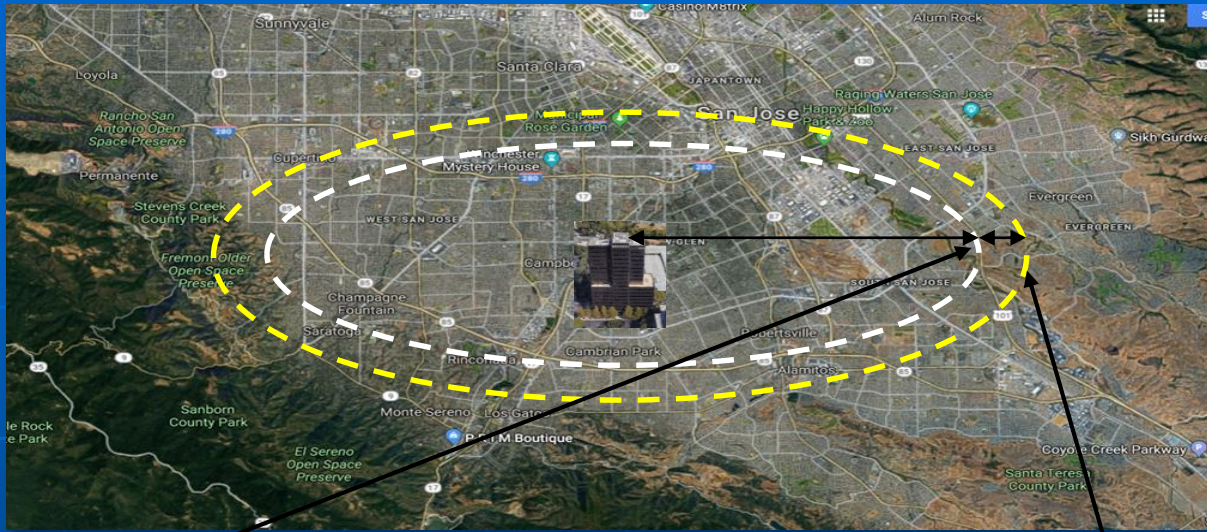


Figure 5 LRS on the tallest building in the area

AP's max distance from LRS (AP's safe area boundary with LOS to a licensed station)

Client's max distance from AP (Client's safe area boundary with LOS to a licensed station)

Once the Prior Coordination process is successfully completed, all the AFC has to do when an AP is connected to the Internet is authenticate the AP and determine its latitude, longitude and height to confirm that it is within the “safe area,” and if it is, the AFC will assign the AP the transmit frequency of the LRS.

Conclusion

	Inclusion Zone	Exclusion Zone
New Licensed Stations	Licensed (Per Part 101)	Licensed (Per Part 101)
Interference Prevention	Once, Before Deployment During Prior Coordination	Millions of times, After Deployment and in Very Risky Real-Time
AFC	Simple, for all Indoor & Outdoor APs	Very Complicated, Risky. Contentious debate.
AP (EIRP 36 dBm max.) Maximum Distance from the LRS is Application Specific (typically 6 miles)	Only ONE type of AP required for Outdoor and Indoor	Contentious debate on requirement for different types of APs
Client (EIRP 24 dBm max.) Distance from the AP is 2 km max.	Outdoor and Indoor	Contentious debate on Clients re power, and if AFC required.
AP Under Control of AFC	Yes	See debates above
Client Under Control of AFC	No, Controlled by AP	See debates above

Table 1

Table 1 shows the benefits of allowing the use of unlicensed devices within an Exclusion Zone (Inclusion Zone).

By the Frequency Coordinator performing a one-time interference analysis and submitting that analysis for review by all FS operators within 125 miles of the LRS (250 miles on the main lobe), if the FS operators agree, the LRS can be licensed.

Also, we believe the aspirations of the RLAN Group will have been achieved.